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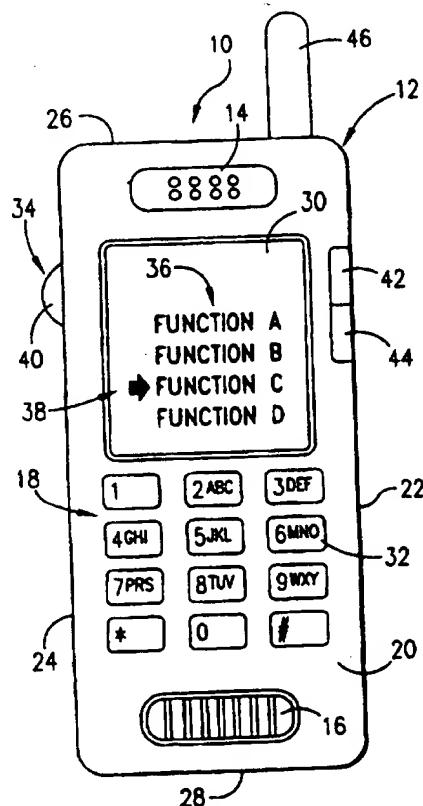
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(54) Title: MOBILE TELEPHONE HAVING USER INTERFACE INCLUDING NAVIGATION AND SELECTION CONTROLS

## (57) Abstract

An improved mobile telephone handset (10) and multiple-function user interface (18) is provided which allows true one-handed operation of the handset (10). The user interface (18) includes a display (30) for presenting a plurality of individual user function labels (36) and a movable indicator (38); a user control (34) is also provided and is operably coupled with the display (30) for selective movement of the indicator (38) to a desired function label (36), whereupon the corresponding function may be initiated. The control (34) may include a rotatable track ball (40) and depressible keys (42, 44) located on opposite sidewalls of the handset housing (12). The interface also includes fixed label DTMF signaling keys (32).



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MOBILE TELEPHONE HAVING USER INTERFACE  
INCLUDING NAVIGATION AND SELECTION CONTROLS

5 Background of the Invention

1. Field of the Invention

The present is broadly concerned with an improved mobile telephone handset and user interface which allows easy, one-hand operation of the handset while retaining all of the multiple functions of high-quality handsets. More particularly, the invention pertains to such a handset, and a method of using the same, wherein a dynamic visual display is provided for presenting a plurality of individual user function labels, and a movable location indicator; the phone is equipped with manually manipulable user control means (e.g., a dial or track ball) for selective movement of the location indicator to individual function-initiating locations on the display, and means for selectively initiating the respective functions. In this way, the user may readily select from a large directory of functions and initiate those functions, all in a one-handed operation.

25 2. Description of the Prior Art

The design of user-friendly and ergonomically efficient mobile telephone handsets has been a continuing problem for the telecommunications industry. On the one hand, the consuming public demands that such handsets have a large number of features such as a directory of memorized telephone numbers and rapid dialing. On the other hand, experience has proved that providing all of the many desired features can create a complicated user interface.

35 One heretofore unresolved goal in the design of mobile telephone handsets is the ability to provide a user interface which gives true one-handed operation. In most prior units, the handset must be held in one hand while

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the various keys are depressed by the other hand. When it is considered that many such handsets are operated while the user is also attempting to drive an automobile, it is readily apparent that such two-handed operations are both 5 cumbersome and dangerous.

In an effort to minimize the number of entry keys while maintaining or increasing the available handset features, it has been known to employ entry keys which may be used to initiate multiple functions. Such multi-function entry keys are commonly designed to provide specific functions which are tied to a particular operational context. These systems have tended to be very complicated for users, and as a result many of the provided functions go unused. However, even with handsets 10 having context-sensitive function keys, two-handed 15 operation is the norm.

There is accordingly a real and unsatisfied need in the art for mobile telephone handsets and user interfaces for use therein which provide true one-handed 20 operation while giving all of the desired functions commonly found in existing handsets. There is also a need for a mobile telephone handset that provides for more labels for constructing more control commands without 25 increase the number of keys on the handset.

#### Summary of the Invention

The present invention overcomes the problems outlined above and provides an improved mobile telephone handset in the form of a portable telephone including a 30 housing having the usual earpiece and mouthpiece means thereon, together with a user interface of enhanced functionality. The user interface comprises dynamic visual display means for presenting a plurality of individual user functional labels, together with a movable 35 location indicator. Manually manipulable user control

means is operably coupled with the display for selective movement of the location indicator to respective function-initiating locations on the display, with each of the locations corresponding to an individual function label.

5 The user control means also provides for selective initiation of the function associated with each label, when the location indicator is moved to the corresponding function-initiating location. The overall handset and interface further comprises the usual fixed-label 10 signaling keys operably coupled with the display means. These fixed label keys are normally Dual Tone Multi-Frequency (DTMF) keys containing the dialing digits 0-9 along with a plurality of corresponding alphabetical characters, and the \* and # keys.

15 The movable location indicator may be in the form of a moveable pointer, scrollable cursor or similar indicator or may change the font, or look of the information to which is being pointed. The user control means can be operated to shift the moveable location 20 indicator between the various functions displayed and to scroll the content of the display. The user control means may include separate operating elements for location indicator movement and function-initiating operations, or these operating elements or functions can be combined in 25 a single manipulable element.

#### Brief Description of the Drawings

Figure 1 is a front elevational view of a mobile telephone handset in accordance with the invention,

30 Fig. 2 is sequential view of the dynamic display forming a part of the user interface of the handset, illustrating the moving location indicator; and

Fig. 3 is a front elevational view of another embodiment of the mobile telephone handset in accordance 35 with the invention additionally showing CALL and END keys.

Detailed Description of the Preferred Embodiment

Turning now the drawings, and particularly Fig. 1, a mobile handset 10 is illustrated which broadly includes a housing 12 supporting thereon an earpiece 14, 5 mouthpiece 16 and a user interface broadly referred to by the numeral 18.

In more detail, the housing 12 is typically in the form of an elongated, generally rectangular body presenting an operating face or wall 20, sidewalls 22, 24, 10 end walls 26, 28, and a backwall. As illustrated, the earpiece 14 is located adjacent atop the handset near end wall 26, whereas mouthpiece 16 is situated near the base of the handset proximal to end wall 28. Those skilled in the art will appreciate that the earpiece and mouthpiece 15 means 14, 16 are themselves entirely conventional.

User interface 18 includes a dynamic display 30, a plurality of fixed label DTMF signaling keys 32 and manipulable user control means generally referred to by the numeral 34.

20 The display 30 is mounted on front wall 20 of housing 12 and is operable for presenting a plurality of individual user function labels 36 thereon. As illustrated in Fig. 1, these functions are generically referred to as functions A-D, respectively, but it is 25 contemplated that the memory associated with handset 12 will be capable of storing a large number of individual user functions. The display 30 also presents a movable location indicator 38. As will be readily appreciated, the location indicator 38 can be moved to a plurality of 30 respective locations on display 30, with each such location corresponding to a given function label.

The DTMF keys 32 are themselves wholly conventional and are provided to allow the typical dialing of handset 10 by successive depression of the keys.

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The user control means 34 includes a track ball 40 or dial mounted on the telephone handset such as on sidewall 24 and operably coupled with display 30 for movement of location indicator 38. In the form shown, the 5 track ball is rotatable under the influence of a manually applied tangential force. The overall control means 34 also includes a desired number (here two) depressible keys 42, 44 mounted on the telephone handset such as on the opposed sidewall 22. At least one of these keys is 10 operably coupled with the display 30 for initiating a function indicated by the location indicator 38. The remaining key may be used for other functions, e.g., to turn the mobile telephone on or off, to undo or cancel a previous action, or other dedicated usage. As illustrated 15 in Fig. 1, handset 10 also includes antenna 46.

The functions of the user control means 34 may also be combined into a single element. For example, a single dial or track ball can be provided that is operable for moving the location indicator 38, for initiating a 20 function pointed to by the location indicator 38, undoing or cancelling the previous action, or turning the telephone on or off.

In the use of handset 10, the unit is first turned on and the initial screen of functions will be 25 displayed. The user then manipulates track ball 40 to move the location indicator 38 to the desired function in the well known manner. Once the desired function is indicated by the presence of location indicator 38 adjacent thereto, the appropriate function-initiating key 30 42 or 44 is depressed, thereby commencing operation of the selected function. To give but one example, one of the selected function labels may be "DIRECTORY", which the user will understand to represent a series of commonly dialed telephone numbers stored in memory. The user will then 35 rotate track ball 40 until the location indicator 38 is

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adjacent the "DIRECTORY" function label, and then depress the appropriate key 42 or 44. This would cause the directory to be displayed on display 30, and the latter could be moved in the same manner as the function labels 5 36. When the desired number is reached, the appropriate key 42 or 44 would be depressed to automatically dial that telephone number.

As illustrated in Fig. 2, it is contemplated that the location indicator 38 may be moved along display 10 30 so as to successively bring up all of the individual function labels during moving of the location indicator. Thus, the original display screen may display functions A- 15 D and the location indicator 38 may be readily moved between these four functions. However, continued manipulation of track ball 40 when the location indicator reaches function D causes another function E to be 20 displayed whereas the initial function A is no longer displayed. Thus, the user can successively display any number of functions out of the total directory of functions stored in the memory of the handset. The number of functions that can be displayed depends upon the size of the display screen.

It will be appreciated that the handset 10 of the invention provides easy one-handed operation. The 25 user can readily hold the handset in one hand and manipulate track ball 40 or dial with his fingers. When the location indicator 38 is positioned adjacent the desired function label, the user can then depress the appropriate key 42 or 44 with his thumb. Advantageously, 30 the user manipulates track ball 40 in a "palm-up" condition (i.e., the user's hand does not cover the device and shield it from his or her line of sight). This is in contrast to conventional computer mouse devices where the user manipulates the mouse in a "palm-down" condition

(i.e., the user's hand covers the mouse from the user's line of sight).

While the user control means 34 has been illustrated as including separate elements, namely track ball 40 and keys 42, 44 mounted on opposite sidewalls of the housing 12, the invention is not so limited. For example, a modified track ball could be provided which is of dual functionality, i.e., the ball could be rotated for pointer or cursor movement until the location indicator 38 reaches the desire function label, whereby the ball could be depressed to initiate the corresponding function. Further, if desired, a simple rotatable dial or translatable slide could be provided in lieu of track ball 40.

Additionally, although the user control means 34 has been described in connection with a mobile telephone, it may also be used with other hand-held devices such as pagers, PDA, and pocket organizers.

Fig. 3 illustrates another embodiment 48 of a mobile telephone handset in accordance with the invention which is similar to the embodiment of Fig 1 except for the addition of CALL key 50 and END key 52. As will be appreciated, these keys activate conventional functions found in mobile telephone handsets. More particularly, activation of CALL key 50 (sometimes called a "send" key) initiates communication and END key 52 ends communication. Having thus described the preferred embodiment of the present invention, the following is claimed as new and desired to be secured by Letters Patent:

Claims:

1. A mobile telephone handset, comprising:  
a portable telephone including a housing having ear-  
piece and mouthpiece means supported thereon;  
5 and

a user interface operably supported on said housing  
and including--

dynamic visual display means for presenting a  
plurality of individual user function  
10 labels and a movable indicator;

a plurality of fixed-label signaling keys  
operably connected with said display means;  
and

manually manipulable user control means operably  
15 coupled with said display means for  
selective movement of said indicator to  
respective function-initiating locations on  
said display with each of said locations  
corresponding to an individual function  
20 label, and for selectively initiating the  
function associated with each function  
label when said indicator is moved to the  
corresponding function-initiating location.

25 2. The handset of claim 1, said indicator  
comprising a moveable pointer.

30 3. The handset of claim 1, said fixed-label  
signaling keys being DTMF signaling keys.

35 4. The handset of claim 1, said manually  
manipulable means comprising a first indicator moving  
means and a second function-initiating means separate from  
said first indicator moving means.

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5. The handset of claim 4, said indicator moving means comprising a rotatable member movable under the influence of a manually applied tangential force.

5 6. The handset of claim 5, said member comprising a dial.

7. The handset of claim 5, said member comprising a track ball.

10 8. The handset of claim 4, said function initiating means comprising at least one manually depressible key.

15 9. The handset of claim 4, said housing presenting an elongated operating face, an opposed back, and side and end margins extending between said operating face and back, said first indicator moving means and said second function initiating means being located on opposed  
20 side margins of said housing.

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10. A user interface for use in a mobile telephone handset, said user interface comprising:

5 dynamic visual display means for presenting a plurality of individual user function labels and a movable indicator;

a plurality of fixed-label signaling keys operably connected with said display means; and

10 manually manipulable user control means operably coupled with said display means for selective movement of said indicator to respective function-initiating locations on said display with each of said locations corresponding to an individual function label, and for selectively initiating the function associated with each function label 15 when said indicator is moved to the corresponding function-initiating location.

11. The interface of claim 10, said indicator comprising a moveable pointer.

20 12. The interface of claim 10, said fixed-label signaling keys being DTMF signaling keys.

25 13. The interface of claim 10, said manually manipulable means comprising a first indicator moving means and a second function-initiating means separate from said first indicator moving means.

30 14. The interface of claim 13, said indicator moving means comprising a rotatable member movable under the influence of a manually applied tangential force.

15. The interface of claim 14, said member comprising a dial.

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16. The interface of claim 14, said member comprising a track ball.

17. The interface of claim 13, said function 5 initiating means comprising at least one manually depressible key.

18. The interface of claim 13, said first indicator moving means and said second function initiating 10 means being located in laterally spaced relationship to each other.

19. A method of using a portable telephone handset, comprising the steps of:

15 providing a dynamic visual display on said handset for presenting a plurality of user function labels and an indicator;  
providing manually manipulable user control means on 20 said handset and operably coupled with said display means for selective movement of said indicator to respective function-initiating locations on said display with each of said locations corresponding to an individual function label, and for selectively initiating the function associated with each function label 25 when said indicator is moved to the corresponding function-initiating location;  
manipulating said user control means for moving said indicator to a desired function-initiating location; and 30 further manipulating said user control means for initiating the function corresponding to said desired function-initiating location.

FIG. 1.

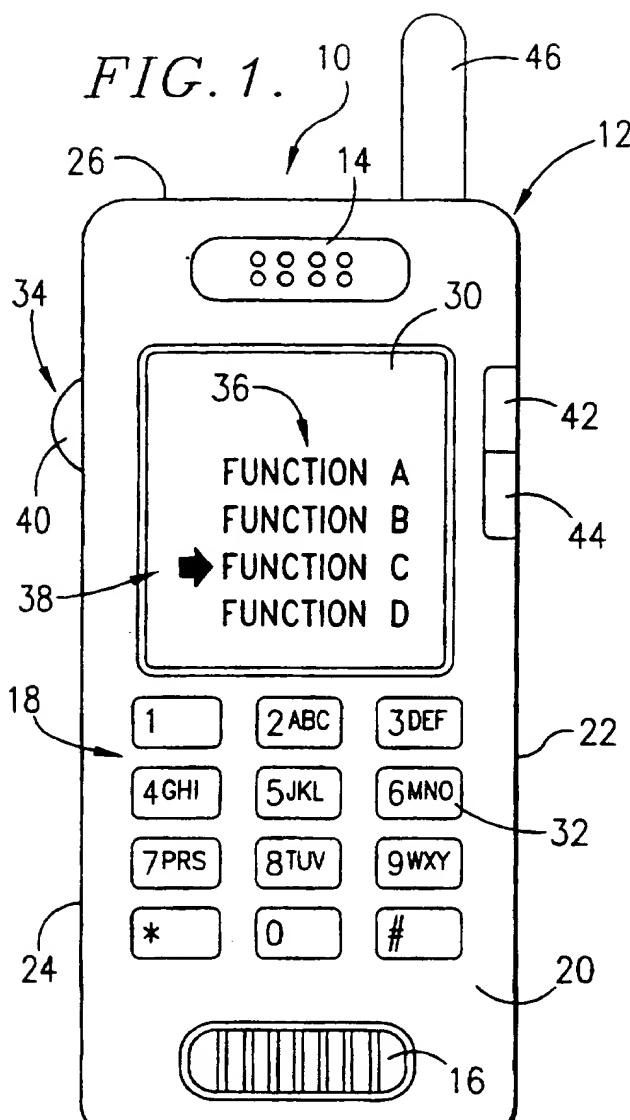


FIG. 3.

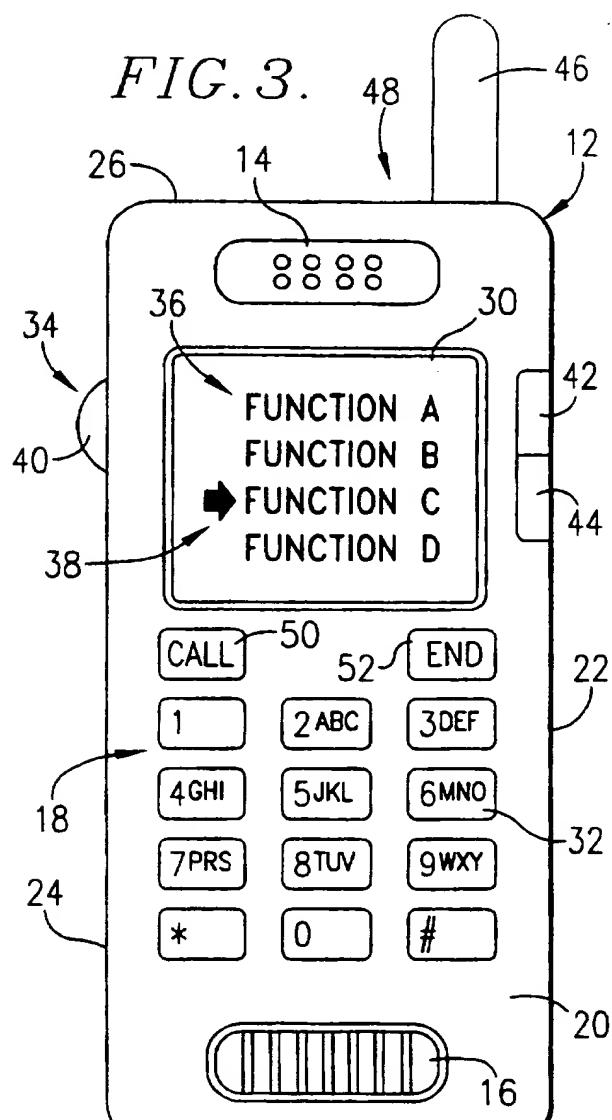
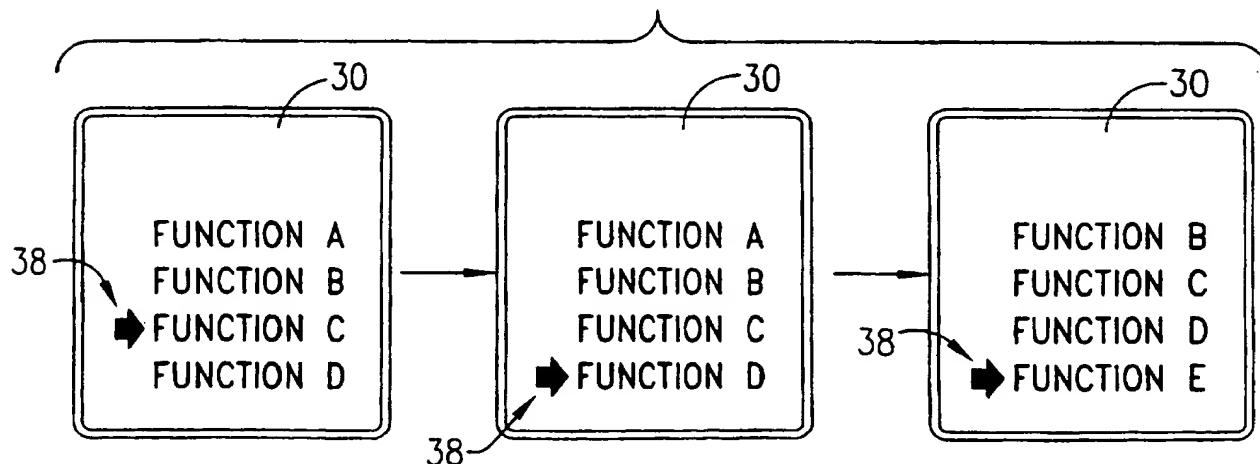


FIG. 2.



## INTERNATIONAL SEARCH REPORT

International application No.

PCT/US97/02123

## A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) : H04M 11/00; H04Q 7/00, 7/18, 7/32, 7/38  
US CL : 379/58, 59, 61, 110, 354, 355; 455/33.1

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 379/58, 59, 61, 110, 354, 355; 455/33.1

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

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## C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages   | Relevant to claim No. |
|-----------|--|-----------------------|
| Y         | US 5,425,077 (TSOI) 13 June 1995, Figs. 2, 5, 7, 9, col. 2, lines 41-66, col. 3, lines 1- 37, col. 4, lines 28-32, col. 5, lines 15-18, col. 6, lines 1-44.  | 1-19                  |
| Y         | US 5,436,954 A (NISHIYAMA ET AL) 25 July 1995, Figs. 1, 8, col. 3, lines 40-44, col. 4, lines 11-67, col. 5, lines 20-66, col. 8, line 33 - col. 9, line 11. | 1-19                  |
| Y         | US 5,490,280 A (GUPTA ET AL) 06 February 1996, col. 6, lines 10-21.  | 7, 16                 |
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Further documents are listed in the continuation of Box C.

See patent family annex.

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